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(54) **SYSTEM AND METHOD FOR CONTROLLING AIRBAG**

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G06K 9/00	(2006.01)
B60R 21/0134	(2006.01)
G01C 21/36	(2006.01)
G01C 21/26	(2006.01)

(52) **U.S. Cl.**

CPC ***B60R 21/013*** (2013.01); ***B60R 21/0134*** (2013.01); ***G01C 21/26*** (2013.01); ***G01C 21/3697*** (2013.01); ***G06K 9/00805*** (2013.01); *Y02T 10/84* (2013.01)

(58) **Field of Classification Search**

CPC B60R 21/013; B60R 21/0134; G06K 9/00805; G01C 21/3697; G01C 21/26; Y02T 10/84

See application file for complete search history.

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(57) **ABSTRACT**

A system for controlling an airbag may include: an accident information collector configured to collect accident information and divide an entire road into a plurality of sections; an accident information analyzer configured to generate statistical information for each section by analyzing the accident information; a threshold value calculator configured to calculate a threshold value for each section, wherein the threshold value is a reference for inflating the airbag; and a inflation controller configured to determine whether to inflate the airbag based on the threshold value for each section.

8 Claims, 4 Drawing Sheets

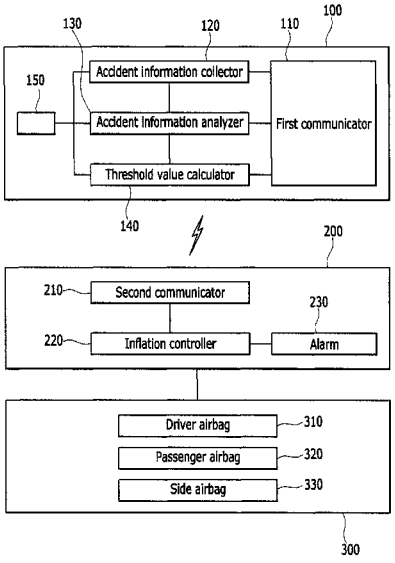


FIG. 1

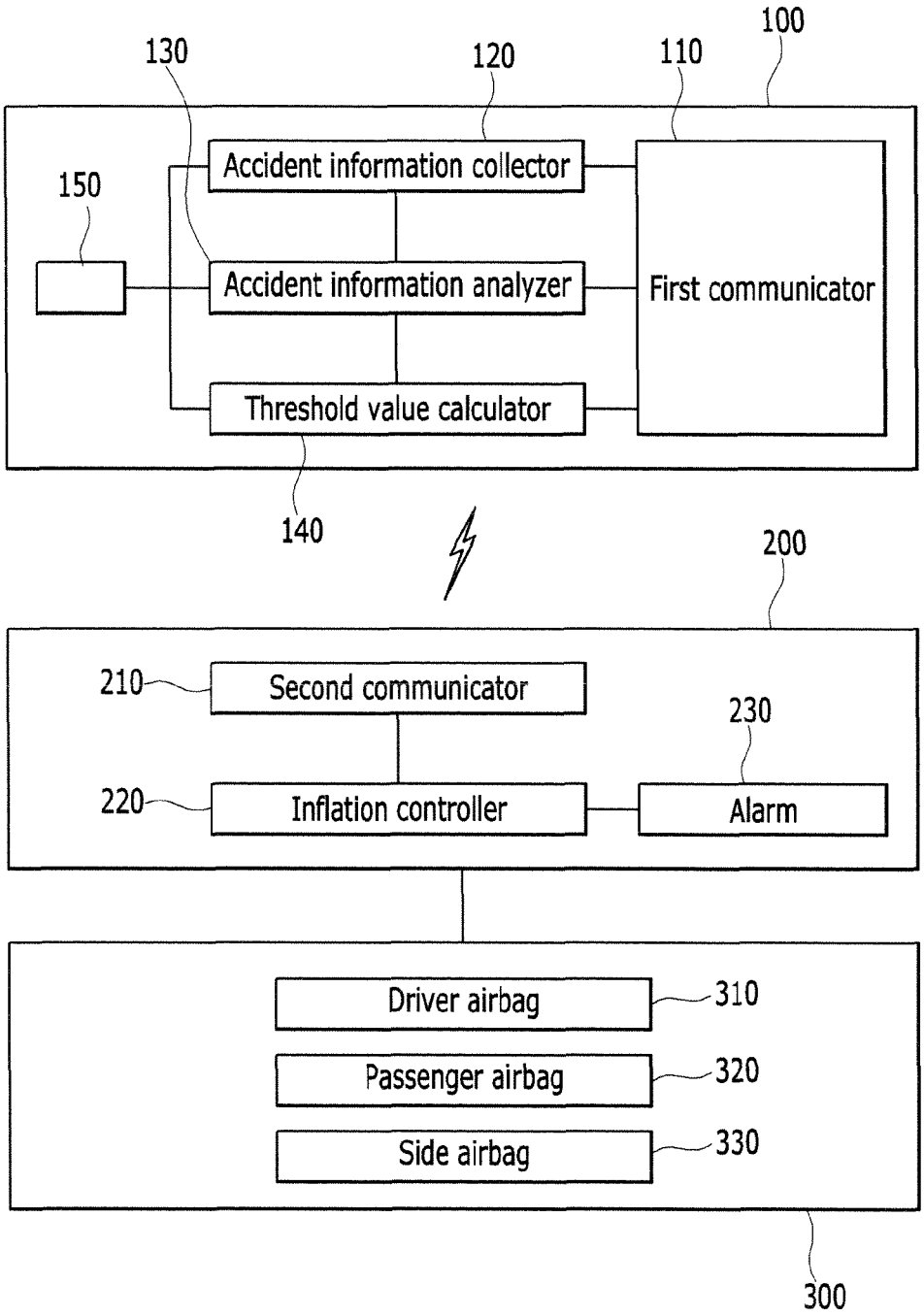

100
130
120
110
150
Accident information collector
Accident information analyzer
Threshold value calculator
First communicator
140
200
210
Second communicator
230
220
Inflation controller
Alarm
Driver airbag
310
Passenger airbag
320
Side airbag
330
300

FIG. 2

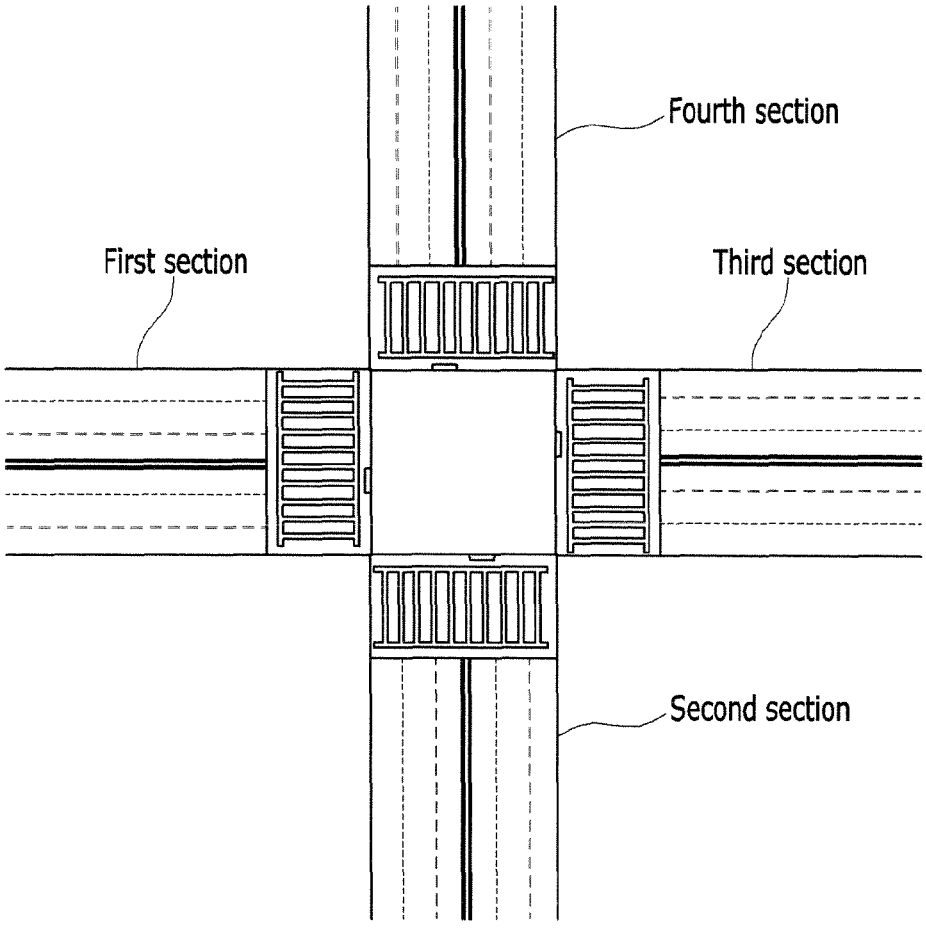

Fourth section
First section
Third section
Second section

FIG. 3

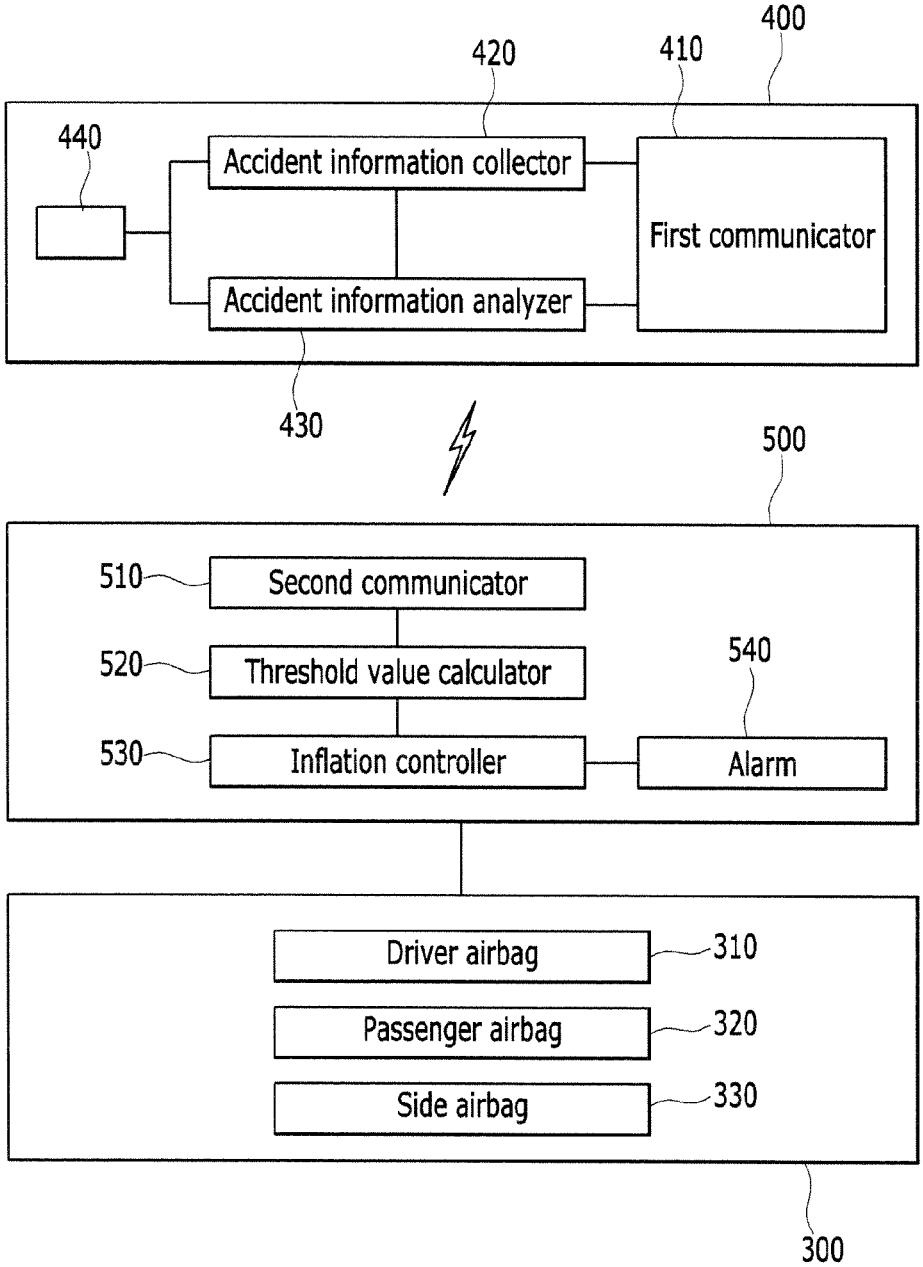
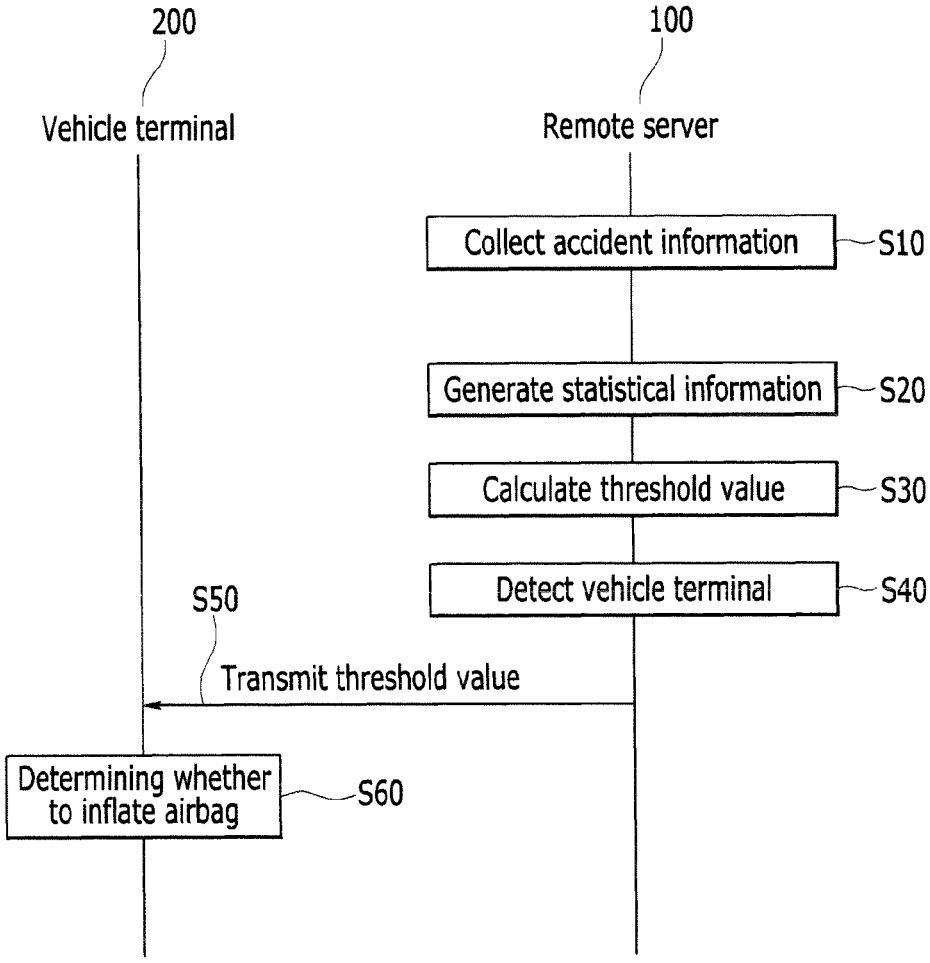

400
420
410
440
Accident information collector
First communicator
Accident information analyzer
430
500
510
Second communicator
520
Threshold value calculator
540
530
Inflation controller
Alarm
Driver airbag
310
Passenger airbag
320
Side airbag
330
300

FIG. 4


200
Vehicle terminal
100
Remote server
Collect accident information
S10
Generate statistical information
S20
Calculate threshold value
S30
Detect vehicle terminal
S40
S50
Transmit threshold value
Determining whether to inflate airbag
S60

SYSTEM AND METHOD FOR CONTROLLING AIRBAG

CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority to and the benefit of Korean Patent Application No. 10-2014-0054344 filed in the Korean Intellectual Property Office on May 7, 2014, the entire contents of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present disclosure relates to a system and a method for controlling an airbag.

BACKGROUND

An airbag and a seat belt are safety apparatuses that protect drivers or passengers from impact when an accident occurs.

The airbag is installed at the front or side of a driver's seat. When a signal from a front collision sensor or a side collision sensor is received, is determined whether or not to inflate the airbag according to impact amount of the collision. The airbag is inflated if the impact amount satisfies a threshold value. The threshold value is preset when manufacturing the airbag.

Since the threshold value is preset as a fixed value, the airbag may not be appropriately inflated. In other words, the airbag may be inflated with insignificant impact and thus a secondary accident such as injury of driver or repair cost occurs.

The above information disclosed in this Background section is only for enhancement of understanding of the background of the invention and therefore it may contain information that does not form the prior art that is already known in this country to a person of ordinary skill in the art.

SUMMARY

The present inventive concept has been made in an effort to provide a system and a method for controlling an airbag having advantages of changing a threshold value for inflating the airbag according to a vehicle position.

A system for controlling an airbag according to an exemplary embodiment of the present invention may include: an accident information collector configured to collect accident information and divide an entire road into a plurality of sections; an accident information analyzer configured to generate statistical information for each section by analyzing the accident information; a threshold value calculator configured to calculate a threshold value for each section, wherein the threshold value is a reference for inflating the airbag; and a inflation controller configured to determine whether to inflate the airbag based on the threshold value for each section.

The accident information collector, the accident information analyzer and the threshold value calculator may be included in a remote server and the inflation controller may be included in a vehicle terminal.

When the vehicle terminal enters a section where many accidents occur, the remote server may transmit the threshold value corresponding to the section where many accidents occur to the vehicle terminal.

The accident information collector and the accident information analyzer may be included in a remote server and the threshold value calculator and the inflation controller may be included in a vehicle terminal.

The accident information may include at least one of information on a vehicle identifier, time when an accident occurs, weather, location where the accident occurs, the type of the vehicle, the type of the accident, a vehicle speed immediately before the accident occurs, whether airbag is inflated.

The statistical information for each section may include at least one of information on the type of accident and accident occurrence frequency.

A method for controlling an airbag according to an exemplary embodiment of the present invention may include: collecting, by a remote server, accident information; dividing, by the remote server, an entire road into a plurality of sections; generating, by the remote server, statistical information for each section by analyzing the accident information; calculating, by the remote server, a threshold value for each section based on the statistical information for each section, wherein the threshold value is a reference for inflating the airbag; and transmitting, by the remote server, the threshold value for each section to a vehicle terminal.

When the vehicle terminal enters a section where many accidents occur, the transmitting the threshold value for each section to a vehicle terminal may include transmitting by the remote server, the threshold value corresponding to the section where many accidents occur.

According to the exemplary of the present invention, the threshold value for each section may be calculated based on the accident information and the statistical information, and the inflation of the airbag can be controlled when the vehicle enters the section where many accidents occur. Therefore, the driver airbag, the passenger airbag, and the side airbag may be separately controlled based on the threshold value for each section, and thereby it is possible to improve safety of the driver and passenger.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a block diagram of a system for controlling an airbag according to an exemplary embodiment of the present invention.

FIG. **2** is a drawing illustrating a plurality of sections according to an exemplary embodiment of the present invention.

FIG. **3** is a block diagram of a system for controlling an airbag according to another exemplary embodiment of the present invention.

FIG. **4** is a flow chart of a method for controlling an airbag according to an exemplary embodiment of the present invention.

DETAILED DESCRIPTION OF THE EMBODIMENTS

Hereinafter, the present inventive concept will be described more fully with reference to the accompanying drawings, in which exemplary embodiments of the invention are shown.

Throughout the specification, unless explicitly described to the contrary, the word "comprise" and variations such as "comprises" or "comprising", will be understood to imply the inclusion of stated elements but not the exclusion of any other elements. In addition, the terms "-er", "-or", and "module" described in the specification mean units for processing at least one function and operation, and can be implemented by hardware components or software components and combinations thereof.

FIG. **1** is a block diagram of a system for controlling an airbag according to an exemplary embodiment of the present invention.

As shown in FIG. **1**, a system for controlling an airbag according to an exemplary embodiment of the present invention may include a remote server **100** and a vehicle terminal **200**. The remote server **100** may be provided in a telematics center and the vehicle terminal **200** may be provided in a vehicle. The remote server **100** and the vehicle terminal **200** are connected each other through a wired or wireless network.

The remote server **100** collects accident information from an accident vehicle and calculates a threshold value for each section. The threshold value is a reference value for inflating airbag **300**.

The remote server **100** may include a first communicator **110**, an accident information collector **120**, an accident information analyzer **130**, a threshold value calculator **140**, and a storage **150**.

The remote server **100** receives the accident information from the accident vehicle through the first communicator **110** and transmits the threshold value calculated by the threshold value calculator **140** to the vehicle terminal **200**.

The first communicator **110** is configured to transmit or receive information with at least one of a base station, an external terminal, and a server through a wired or a wireless network. In detail, the first communicator **110** may receive the accident information from the accident vehicle, other vehicles located within a predetermined distance from the accident vehicle, a closed circuit television (CCTV), a traffic information center, and the like.

The accident information collector **120** collects the accident information through the first communicator **110**. The accident information may include information on a vehicle identifier, the time when the accident occurs, weather, the location where the accident occurs, the type of the vehicle, the type of the accident, a vehicle speed immediately before the accident occurs, whether the airbag is inflated, and the like. In addition, the accident information collector **120** may divide an entire road into a plurality of sections.

FIG. **2** is a drawing illustrating a plurality of sections according to an exemplary embodiment of the present invention.

As shown in FIG. **2**, the plurality of sections may include a first section, a second section, a third section, and a fourth section. For example, accident information corresponding to the sections shown in FIG. **2** is shown in Table 1.

TABLE 1

Vehicle identifier	Time when accident occurs	Weather	Location where accident occurs	Type of vehicle	Type of accident	Vehicle speed (km/h)	...
First vehicle	February 10/morning	Rain	First section	Sedan	Front Collision	40	...
Second vehicle	February 11/morning	Snow	Second section	Sedan	Left side collision	50	...
Third vehicle	March 03/afternoon	Sunny	Second section	Sedan	Left side collision	50	...
...	...	...	...	...	...	...	

The accident information analyzer **130** generates statistical information for each section by analyzing the accident information when the accident information collector **120** collects the accident information. The statistical information for each section may include information on the type of accident, accident occurrence frequency, and the like. In addition, the accident information analyzer **130** may generate an alarm message for indicating an accident risk based on the statistical information.

For example, statistical information for each section generated by the accident information analyzer **130** is shown in Table 2.

TABLE 2

Location where accident occurs	Type of accident		Accident occurrence frequency	...
First section	Vehicle - vehicle	Front collision	Twenty times/ year	...
First section	Vehicle - vehicle	Left side collision	Eighty times/ year	...
First section	Vehicle - vehicle	Right side collision	Thirteen times/ year	...
...		...	...	
First section	Vehicle - person	Front collision	Forty one times/ year	...
Second section	Vehicle - vehicle	Left side collision	Eight times/ year	...
...		...	Left side collision	

Table 2 shows that left side collisions between vehicles most frequently occurs in the first section.

The threshold value calculator **140** calculates the threshold value for each section when the accident information analyzer **130** generates the statistical information for each section.

In detail, the threshold value calculator **140** may calculate the threshold value for each section based on the type of accident and accident occurrence frequency for each section.

For example, since the left side collisions between vehicles most frequently occurs in the first section, the threshold value calculator **140** calculates the threshold value corresponding to the first section in preparation for the left side collision between vehicles. That is, the threshold value calculator **140** calculates the threshold value which is a reference for inflating a side airbag. Since the left side collisions between vehicles occurs in the second section less than in the first section, the threshold value corresponding to the second section is lower than the threshold value corresponding to the first section. That is, the side airbag is easily inflated in the first section.

The threshold value for each section is transmitted to the vehicle terminal **200** through the first communicator **110**. For example, the threshold value calculator **140** may transmit the threshold value for each section to the vehicle terminal **200** when the vehicle enters the first section.

The accident information, the statistical information and the threshold value for each section are stored in the storage **150**.

The vehicle terminal **200** controls inflating of the airbag **300** based on the threshold value for each section. The vehicle terminal **200** may include a second communicator **210**, an inflation controller **220**, and an alarm **230**.

The second communicator **210** is configured to transmit and receive information with the remote server **100** through the wired or the wireless network. That is, the second communicator **210** performs communication with the first communicator **110** and receives the threshold value for each section and the alarm message indicating an accident risk.

The inflation controller **220** determines whether to inflate the airbag **300** based on the threshold value for each section.

The airbag **300** may include a driver airbag **310**, a passenger air bag **320**, and a side airbag **330**.

The inflation controller **220** may separately control the driver airbag **310**, the passenger airbag **320**, and the side airbag **330** based on the threshold value for each section.

The alarm **230** may provide the warning message, which is transmitted from the remote server **100**, to the driver.

FIG. **3** is a block diagram of a system for controlling an airbag according to another exemplary embodiment of the present invention.

As shown in FIG. **3**, a system for controlling an airbag according to another exemplary embodiment of the present invention may include a remote server **400** and a vehicle terminal **500**. The remote server **400** may include a first communicator **410**, an accident information collector **420**, an accident information analyzer **430**, and a storage **440**. The vehicle terminal **500** may include a second communicator **510**, a threshold value calculator **520**, and an inflation controller **530**.

The accident information analyzer **430** generates statistical information for each section by analyzing accident information when the accident information collector **420** collects the accident information.

The statistical information for each section is transmitted to the vehicle terminal **500** through the first communicator **410**.

The threshold value calculator **520** may calculate the threshold value for each section based on the type of accident and accident occurrence frequency for each section.

The inflation controller **530** determines whether to inflate the airbag **300** based on the threshold value for each section.

Since the system for controlling the airbag according to the current embodiment of the present invention is similar to the system for controlling the airbag according to the previous exemplary embodiment of the present invention, except for the threshold value calculator **520** is included in the vehicle terminal **500**, a detailed description will be omitted.

FIG. **4** is a flow chart of a method for controlling an airbag according to an exemplary embodiment of the present invention.

Hereinafter, description will be made based on the system for controlling the airbag shown in FIG. **1**.

The remote server **100** collects accident information at step S**10**. The accident information may include information on a vehicle identifier, the time when the accident occurs, weather, the location where the accident occurs, the type of the vehicle, the type of the accident, a vehicle speed immediately before the accident occurs, whether airbag is inflated, and the like. In addition, the remote server **100** may divide the entire road into the plurality sections.

The remote server **100** generates statistical information for each section by analyzing the accident information at step S**20**. The statistical information for each section may include information on the type of accident, accident occurrence frequency, and the like.

The remote server **100** calculates the threshold value for each section based on the statistical information for each section at step S**30**. The remote server **100** may calculate the threshold value for each section based on the type of accident and accident occurrence frequency for each section.

When the remote server **100** detects the vehicle terminal **200** entering a section where many accidents occur at step S**40**, the remote server **100** transmits the threshold value corresponding to the section where many accidents occur to the vehicle terminal **200** at step S**50**. In this case, the remote server **100** may transmit the alarm message indicating an accident risk of the section to the vehicle terminal **200**.

The vehicle terminal **200** determines whether to inflate the airbag **300** based on the threshold value corresponding to the section where many accidents occur at step S**60**.

As described above, according to the exemplary of the present invention, the threshold value for each section may be calculated based on the accident information and the statistical information, and the inflation of the airbag can be controlled when the vehicle enters the section where many accidents occur. Therefore, the driver airbag, the passenger airbag, and the side airbag may be separately controlled based on the threshold value for each section, and thereby it is possible to improve safety of the driver and passenger.

While this invention has been described in connection with what is presently considered to be practical exemplary embodiments, it is to be understood that the invention is not limited to the disclosed embodiments, but, on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the appended claims.

What is claimed is:

1. A system for controlling an airbag, comprising:

an accident information collector configured to collect accident information and divide an entire road into a plurality of sections;

an accident information analyzer configured to generate statistical information for each section by analyzing the accident information;

a threshold value calculator configured to calculate a threshold value for each section, wherein the threshold value is a reference value for deciding to inflate the airbag; and

an inflation controller configured to determine whether to inflate the airbag based on the threshold value for each section.

2. The system of claim **1**, wherein the accident information collector, the accident information analyzer and the threshold value calculator are included in a remote server and the inflation controller is included in a vehicle terminal.

3. The system of claim **2**, wherein when the vehicle terminal enters a section where many accidents occur, the remote server transmits the threshold value corresponding to the section where many accidents occur to the vehicle terminal.

4. The system of claim **1**, wherein the accident information collector and the accident information analyzer are included in a remote server, and the threshold value calculator and the inflation controller are included in a vehicle terminal.

5. The system of claim **1**, wherein the accident information includes at least one of information on a vehicle identifier, the time when an accident occurs, weather, the location where the accident occurs, the type of the vehicle, the type of the accident, a vehicle speed immediately before the accident occurs, whether airbag is inflated.

6. The system of claim **5**, wherein the statistical information for each section includes at least one of information on the type of accident and accident occurrence frequency.

7. A method for controlling an airbag, comprising:

collecting, by a remote server, accident information;

dividing, by the remote server, an entire road into a plurality of sections;

generating, by the remote server, statistical information for each section by analyzing the accident information;

calculating, by the remote server, a threshold value for each section based on the statistical information for each section, wherein the threshold value is a reference value for deciding to inflate the airbag; and

transmitting, by the remote server, the threshold value for each section to a vehicle terminal.

8. The method of claim **6**, wherein when the vehicle terminal enters a section where many accidents occur, the step of transmitting the threshold value for each section to a vehicle terminal includes transmitting by the remote server, the threshold value corresponding to the section where many accidents occur.

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